

REMARKS

The Office Action dated September 22, 2006, has been carefully considered. Claims 1-15 are pending. Claim 15 has been added to further define the protection to which Applicant is entitled. Applicant requests that the Examiner consider the following remarks, and then pass the application to allowance.

Double Patenting:

Claims 1-14 were rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over Claims 1-33 of U.S. Patent No. 6,850,965.

Applicant attaches with the instant reply a terminal disclaimer, which Applicant respectfully submits obviates the above rejections.

Claim Rejections Under 35 U.S.C. 103(a)

Claims 1-14 were rejected under 35 U.S.C. 103(a) as unpatentable over Huang et al. (U.S. Pat. No. 6,052,384) in view of Mitra, et al. (U.S. Pat. No. 6,331,986).

Claim 1 recites a method for optimal multimedia content delivery over networks from a server to one or more clients, comprising: delineating a state variable that represents the data rate to each client; delineating a set of conditions which represent the time-varying constraints on the data rate of said multimedia content said conditions including: (1) the total data rate for all clients does not exceed the maximum throughput of the server or network, whichever is least; (2) the data rate from server to client does not exceed the maximum data rate for the client; (3) the data rate of the client will never overflow the client buffer; (4) the server will never underflow; and (5) the data rate from the server will never be less than the client's minimum data rate, which is a non-increasing function of time obtained by dividing the content not yet delivered by the remaining play time; delineating a cost function which represents the value of a proposed solution; and performing periodic computations in compliance with conditions (1) - (5) to obtain a state value that maximizes said cost function. (Emphasis added).

Huang relates to a statistical multiplexer that multiplexes varying bit-rate MPEG-2 bit streams onto a satellite up-link. The multiplexer first allocates each bit stream its minimum bandwidth and then allocates any remaining bandwidth to the bit streams in proportion to the difference between the minimum and maximum output rates for the bit streams, with no bit stream receiving more than its maximum output rate. If there is not enough bandwidth to give every bit stream its minimum rate, bit rates are allocated according to priorities assigned to the bit streams.

Mitra relates to a method for solving the joint problem of optimal routing and optimal bandwidth allocation in a network that supports plural subnetworks and plural communication services. The method involves, for each source-destination pair communicating via a given subnetwork and a given class of service, determining a traffic rate to be offered to each of a set of permissible routes between that source and that destination, in the given subnetwork and service class. The method further involves allocating a respective bandwidth to each link of each subnetwork. The determinations of traffic rate to be offered, and the allocations of bandwidth to respective links of subnetworks, are performed in a mutually responsive manner.

Mitra, et al., however, does not teach or suggest "performing periodic computations in compliance with conditions (1) - (5) to obtain a state value that maximizes said cost function." Condition (5), states that "the data rate from the server will never be less than the client's minimum data rate, which is a non-increasing function of time obtained by dividing the content not yet delivered by the remaining play time." Steps 131 and 132 in FIGS. 9 - 11 of Mitra, et al. pertain to solving the optimum routing problem (131) and computing the linearized capacity costs (132). Accordingly, since Mitra, et al. does not teach or suggest "performing periodic computation in compliance with conditions (1) - (5) to obtain a state value that maximizes said cost function," Claim 1 should be allowed. Claims 2-8 are dependent from Claim 1 and should be allowable for the reason set forth as to Claim 1.

Claim 9 as amended recites a method for connection acceptance control for delivery of multimedia data from server to one or more clients over a network, comprising the steps of: determining server swing capacity given by the difference between the total server bandwidth and the sum of the minimum flow rates of all currently-connected clients; and allocating server bandwidth for each prospective client which will fit without server bandwidth saturation, as determined by comparing an average data play rate of each prospective client with the remaining bandwidth, represented by said server swing capacity, available to the server, wherein the minimum flow rate for each client is expressed as a non-increasing function of time obtained by dividing content not yet delivered by remaining play time, and wherein the minimum flow rate ensures that all required content will be available to each client when needed (Emphasis added).

In Huang, as shown in FIG. 7, there are three levels of priority, according to the extent to which timely delivery of the pictures in the bit stream is required. Specifically, Huang includes:

 "PL=1: Every picture in the bit stream will be delivered, and each of them will be delivered on time.

 PL=2: Some picture will always be delivered on time. For example, a picture may be repeated to keep bit buffer 115(i) from underflowing.

 PL=3: No time guarantees. The bit stream could even be interrupted to give the channel to another bit stream." Col. 15, lines 29 - 39.

Huang, does not teach or suggest that "wherein the minimum flow rate for each client is expressed as a non-increasing function of time obtained by dividing content not yet delivered by remaining play time, and wherein the minimum flow rate ensures that all required content will be available to each client when needed." (Emphasis added). Rather, Huang provides for three levels of priority and includes "of course, the possibility that there is not enough total bandwidth to perform the allocation of block 705. This worst-case scenario is called Panic mode and will be further discussed." Col. 15, lines 63-67. Accordingly, Claim 9 should be allowable. Claims 10-13 are dependent from Claim 9 and should be allowable for the reasons set forth above as to Claim 9.

Claim 14 as amended recites a method for bandwidth allocation for delivery of multimedia data from server to one or more clients over a network, comprising: storing a sequence of data representing scheduled bandwidth changes for the server; determining the maximum flow rate and minimum flow rate for each client at the present time, the determination of the minimum flow rate being based on a non-increasing function of time obtained by dividing content not yet delivered by remaining play time, and wherein the minimum allowed flow rate ensures that all required content will be available to each client when needed; determining the flow rate range for each client as given by the difference between said maximum flow rate and said minimum flow rate; sorting the list of clients according to said flow rate range; initializing current flow rate for each client as said minimum flow rate and summing said flow rate into total server flow rate; and allocating remaining server bandwidth to remaining clients.

As set forth above, Huang does not teach or suggest that "wherein the minimum flow rate for each client is expressed as a non-increasing function of time obtained by dividing content not yet delivered by remaining play time, and wherein the minimum flow rate ensures that all required content will be available to each client when needed." (Emphasis added). Accordingly, Claim 14 should be allowable.

New Claim 15

Claim 15 recites the method of Claim 1, wherein the data rate ensures that all required content will be available to each client when needed. For the reasons set forth above as to Claim 1, and further for the reasons set forth in Claims 9 and 14, Claim 15 should be allowable.

Conclusion

In view of the preceding discussion, Applicant respectfully urges that the claims of the present application define patentable subject matter and should be passed to allowance. Such allowance is respectfully solicited.

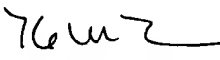
If the Examiner believes that a telephone call would help advance prosecution of the present invention, the Examiner is kindly invited to call the undersigned attorney.

Respectfully submitted,

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